



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,148	07/31/2003	Ron Maurer	100110348-1	6500

7590 02/09/2007
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

CHU, RANDOLPH I

ART UNIT	PAPER NUMBER
----------	--------------

2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/631,148

Applicant(s)

MAURER, RON

Examiner

Randolph Chu

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/31/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10, 13-18 and 20-30 is/are rejected.
- 7) ☒ Claim(s) 8, 9, 11, 12 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/31/2003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 1 recites the limitation "generating a modified bilateral filter by reformulating an initial bilateral filter". It is not clear what has been modified.
4. Claim 6 recites the limitation "said truncated infinite geometric sum". There is insufficient antecedent basis for this limitation in the claim.
5. Claim 7 recites the limitation "said signal processing device". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998).

With respect to claim 1, Tomasi and Manduchi teaches for each pixel location in the image into a sum of the original signal value of a central pixel at said pixel location (When $d(\xi, x) = 0$, then $c(\xi, x) = 1$ and When $s(f(\xi), f(x)) = 0$, then $\delta(f(\xi), f(x)) = 1$) and a bilateral correction term which is a function of local signal differences between the central pixel and its neighbors ($f(\xi)c(\xi, x)$, $f(\xi)s(f(\xi), f(x))$) (Equation (1) and (3)); processing the image using the bilateral filter to generate a filtered output (2. The Idea).

With respect to claim 10, summing, for all said pixels i in the image, contributions from each neighboring pixel j , corresponding to $K_{sub,j}$, wherein the contribution of each said neighboring pixel j is: (a) the photometric weight for each said neighboring pixel j ,

Art Unit: 2624

multiplied by (b) the signal difference between pixel j and the center pixel single channel signal; multiplied by (c) the convolution kernel coefficient $K_{sub,j}$ for the neighboring pixel (j); and adding the single channel center pixel signal to generate the single channel output for the center pixel; wherein said photometric weight for neighboring pixel j is determined by the difference between the center pixel signal and the signal at the neighboring pixel j , corresponding to $K_{sub,j}$; and wherein the convolution kernel coefficient $K_{sub,j}$ is a weight that determines the contribution of neighbor j to a weighted average filter.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 13, 25, 26, and 30 are rejected under 35 USC 103(a) as being unpatentable over Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998) in view of August (US 2003/0156762).

Tomasi and Manduchi teach all the limitations of claim 1 as applied above from which claim 2 respectively depend. Tomasi and Manduchi also teaches processing each pixel (i) in the image with determined by the size of the bilateral filter convolution kernel K_j ; and calculating a filtered value for said pixel (i) using a bilateral filter with

Art Unit: 2624

computer (2. The Idea, Fig. 3). So it is clear that a neighborhood of said pixels are buffered while processing the image using filter as to form the neighborhood, pixels from multiple lines/columns are needed.

Tomasi and Manduchi does not disclose expressly that filter is normalized expression implemented as a Taylor series expansion.

August teaches that filter is normalized expression implemented as a Taylor series expansion (para. [0355]).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Taylor series expansion to implement filter normalization in the method of Tomasi and Manduchi.

The suggestion/motivation for doing so would have been that simpler and efficient bilateral filtering can be achieved by using higher order local approximation.

Therefore, it would have been obvious to combine August with Tomasi and Manduchi to obtain the invention as specified in claim 2.

5. Claims 3, 14, 21, 22 and 27 are rejected under 35 USC 103(a) as being unpatentable over Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998) in view of August (US 2003/0156762) and in further view of mathworld.com (<http://mathworld.wolfram.com/TaylorSeries.html>).

With respect to claim 3, Tomasi and Manduchi in view of August teach all the limitations of claim 2 as applied above from which claim 3 respectively depend.

Tomasi and Manduchi does not disclose expressly that Taylor series expansion is implemented as a truncated infinite geometric sum.

mathworld.com teaches that function can represented as Taylor series of truncated infinite sum.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use truncated infinite sum as Taylor series expansion in the method of Tomasi and Manduchi in view of August.

The suggestion/motivation for doing so would have been that function can be represented or approximated by Taylor series as a sum of infinite terms.

Therefore, it would have been obvious to combine mathworld.com with Tomasi and Manduchi to obtain the invention as specified in claim 3.

With respect to claim 6, Tomasi and Manduchi in view of August teach all the limitations of claim 2 as applied above from which claim 6 respectively depend.

Tomasi and Manduchi does not disclose expressly that said truncated infinite geometric sum having an order of expansion of one is used to implement a signal processing device operating in accordance with said method.

mathworld.com teaches said truncated infinite geometric sum (Taylor series) having an order of expansion of one is used to implement a signal processing device operating in accordance with said method.

Art Unit: 2624

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use truncated infinite sum having an order of expansion of one as Taylor series expansion in the method of Tomasi and Manduchi in view of August.

The suggestion/motivation for doing so would have been that function can be represented or approximated by Taylor series as a sum of infinite terms that omitting the terms remaining after the second order.

Therefore, it would have been obvious to combine mathworld.com with Tomasi and Manduchi to obtain the invention as specified in claim 6.

6. Claims 4, 15 and 28 are rejected under 35 USC 103(a) as being unpatentable over Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998) in view of August (US 2003/0156762) and in further view of Harashima et al. (US 5,710,875).

Tomasi and Manduchi in view of August teach all the limitations of claim 2 as applied above from which claim 4 respectively depend.

Tomasi and Manduchi does not disclose expressly that Taylor series expansion is implemented using an order of expansion of zero.

Harashima et al. teaches that function can represented as Taylor series of truncated infinite sum.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Taylor series implemented using an order of expansion of zero in the method of Tomasi and Manduchi in view of August.

Art Unit: 2624

The suggestion/motivation for doing so would have been that function can be simplified by Taylor series that omitting the terms remaining after the first order.

Therefore, it would have been obvious to combine Harashima et al. with Tomasi and Manduchi to obtain the invention as specified in claim 4.

7. Claims 5, 16, 17, 23, 24 and 29 are rejected under 35 USC 103(a) as being unpatentable over Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998) in view of August (US 2003/0156762) and in further view of Verron ("The Taylor series for Bandlimited Signals, J.Austral Math Soc Ser B 36 (1994) pg 101-106).

Tomasi and Manduchi in view of August teach all the limitations of claim 2 as applied above from which claim 5 respectively depend.

Tomasi and Manduchi does not disclose expressly that Taylor series expansion is implemented as a truncated infinite product.

Verron teaches that function can be represented as Taylor series of a truncated infinite product (Power series) (abstract).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use truncated infinite product as Taylor series expansion in the method of Tomasi and Manduchi in view of August.

The suggestion/motivation for doing so would have been that function can be represented or approximated by Taylor series as a product of infinite terms.

Art Unit: 2624

Therefore, it would have been obvious to combine Verron with Tomasi and Manduchi to obtain the invention as specified in claim 5.

8. with respect to claim 18, Tomasi and Manduchi teaches said image is captured and processed by a digital camera (2. The Idea).

9. Claim 20 is rejected under 35 USC 103(a) as being unpatentable over Tomasi and Manduchi ("Bilateral filtering for gray and color images", Proc. IEE Intl. Conf. on Computer Vision, Bombay, India, 1998) in view of August (US 2003/0156762) and in further view of Osofsky et al. (US 4,152,766).

Tomasi and Manduchi in view of August teach all the limitations of claim 13 as applied above from which claim 20 respectively depend.

Tomasi and Manduchi does not disclose expressly that a bit-shift register, wherein the normalization expression is implemented using the bit-shift register.

Osofsky et al. teaches a bit-shift register, wherein the normalization expression is implemented using the bit-shift register (col. 13 lines 65-69).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to a bit-shift register as normalizer in the system of Tomasi and Manduchi in view of August.

The suggestion/motivation for doing so would have been that normalization process can optimize and maximize processing speed without detracting from picture integrity.

Therefore, it would have been obvious to combine Osofsky et al. with Tomasi and Manduchi to obtain the invention as specified in claim 20.

With respect to claim 13, please refer to rejection for 1 and 2.

With respect to claim 14, please refer to rejection for 3.

With respect to claim 15, please refer to rejection for 4.

With respect to claim 16, please refer to rejection for 5.

With respect to claim 17, please refer to rejection for 5.

With respect to claim 21, please refer to rejection for 1, 2 and 3.

With respect to claim 22, please refer to rejection for 3.

With respect to claim 23, please refer to rejection for 5.

With respect to claim 24, please refer to rejection for 5.

With respect to claim 25, please refer to rejection for 1 and 2.

With respect to claim 26, please refer to rejection for 1 and 2.

With respect to claim 27, please refer to rejection for 3.

With respect to claim 28, please refer to rejection for 4.

With respect to claim 29, please refer to rejection for 5.

With respect to claim 30, please refer to rejection for 1 and 2.

Allowable Subject Matter

10. Claims 8,9, 11, 12 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randolph Chu whose telephone number is 571-270-1145. The examiner can normally be reached on Monday to Thursday from 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 571-272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RIC/



JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER